

XXIV.—*Observations on Raphides and other Crystals in Plants.*
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[Continued from p. 40.]

Liliaceæ.—Of this order we have already seen ('Annals,' Jan. and April, 1864, pp. 42, 293) how some plants abound in, while others are devoid of raphides; and numerous subsequent observations have confirmed and extended those formerly made. I have never failed to find raphides in the leaves and some other parts examined of the following plants:—*Funkia Sieboldiana*, *F. purpurea*, *F. undulata variegata*, *Hemerocallis odora alba* and two other species, *Endymion nutans*, three species of *Muscari*, four species of *Scilla*, three species of *Ornithogalum*, *Asphodelus luteus*, *Asparagus officinalis*, *Convallaria majalis*, *C. fragilis*, *Polygonatum multiflorum*, *Maianthemum bifolium*, *Ruscus aculeatus*, *R. Hypoglossum* (raphides scanty in leaves, but plentiful in perianths of these two species of *Ruscus*), *Dracæna terminalis*, *Agapanthus umbellatus*, *Lachenalia intermedia*, *L. tricolor*, *L. pendula*, *Tritoma Uvaria*, and *T. media*.

On the contrary, I have never yet found raphides in many other plants of the order, even after repeated examinations of specimens from different localities, and still more frequent comparative trials, at all seasons, of a few species growing side by side, in my garden, with raphis-bearing plants of this and other allied orders. The following is a list of *Liliaceæ* in which raphides were not found:—One species and several garden varieties of *Tulipa*, *Fritillaria Meleagris*, *Lilium candidum*, *L. Martagon*, *L. aurantiacum*, nine species of *Allium*, *Lloydia serotina*, *Gagea lutea*, and *Simethis bicolor*. Of these last three plants I have only seen dried portions; and a dry and fresh leaf of *Maianthemum* and one growing plant of *Convallaria fragilis*. In the leaf and bulb of *Erythronium dens canis* raphides were not found, though a very few small raphis-like objects were seen in the roots; in which respect this plant resembles certain *Melanthaceæ*, as *Colchicum* and *Bulbocodium*, noticed in the 'Annals' for April 1864, p. 294.

Crystal Prisms in Liliaceæ.—There are some plants of this order in which, together with either a want, scarcity, or plenty of true raphides, larger crystal prisms occur more or less abundantly, as may be well seen in *Phormium tenax*, and in the species of *Tritoma*, *Dracæna*, *Muscari*, and *Yucca*. These prisms, as described in former communications ('Annals,' Sept. 1863, April, May, and Oct. 1864, and Jan. 1865), differ remarkably from regular raphides, and occur in many *Dicotyledones* and

Monocotyledones—for example, in *Bugainvillea*, *Quillaja*, and *Guaiacum*, and in certain Amaryllidaceæ, Bromeliaceæ, Pontederiaceæ, &c., but, so far as my observations have yet gone, are more generally found in the leaves and different parts of Iridaceæ than in any other order.

These prisms differ also, in their greater length and size, from other smaller prisms, such as those of which the ends project in the form of short points on the surface of many sphæraphides, as may be seen in various Cactaceæ and other Dicotyledones. The prisms of Iridaceæ, &c., are likewise larger than the small prisms which occur separately in the bulb-scales of certain Onions ('Annals,' April 1864, p. 293). In *Allium* these short prisms appear to be composed of oxalate of lime and magnesia, and the larger prisms in Iridaceæ of oxalate of lime, as more particularly noticed in the 'Annals' for June last.

Distribution of Raphides in Liliaceæ.—How far the raphidian character may assist in perfecting a natural definition of this order and its subsections can only be determined after much more extensive observations than I have been able to make. But the present limited ones show Tulipeæ and the Onions regularly devoid of raphides, while Hemerocallideæ, Asparageæ, and the Squills as constantly abound in raphides. Considering only our indigenous plants, specifying the tribes as they stand in Prof. Babington's 'Manual of British Botany,' the results, so far as they at present appear, are as follows:—I. Tulipeæ: all regularly destitute of raphides. II. Asphodeleæ: *Gagea* and *Allium* without raphides, while *Ornithogalum* and *Scilla* abound in raphides. III. Anthericeæ: no raphides found in a dry bit of *Simethis*. IV. Hemerocallideæ: both plants abounding in raphides—which also occur plentifully in every plant (except *Ruscus*, in which they are scanty) of the order Asparagaceæ, standing apart, in Prof. Babington's book, from Liliaceæ.

As an example of the value of the raphidian character, so far as regards our native Liliaceæ, I have always found it easy to distinguish by it, in minute fragments of the leaves alone, a plant of Hemerocallideæ from one of Tulipeæ.

Juncaceæ.—A few small raphides occur in the leaf of *Narthe-cium ossifragum*; but I have in vain searched for them in the indigenous species of *Juncus* and *Luzula*.

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[To be continued.]